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MEDICAL READINESS

DOD Faces Challenges in Implementing Its Anthrax Vaccine Immunization Program

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Contents

Abbreviations

CDC	Centers for Disease Control and Prevention
CHCS	Composite Health Care System
DEERS	Defense Enrollment Eligibility Reporting System
DOD	Department of Defense
DMDC	Defense Manpower Data Center
FDA	Food and Drug Administration
GAO	General Accounting Office
USAMMA	U.S. Army Medical Materiel Agency
VAERS	Vaccine Adverse Event Reporting System

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National Security and
International Affairs Division

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The Honorable Arlen Specter
Chairman
The Honorable John D. Rockefeller IV
Ranking Minority Member
Committee on Veterans' Affairs
United States Senate

The Department of Defense (DOD) regards the biological agent anthrax, an infectious disease that is 99-percent lethal if inhaled by unprotected humans, as the single greatest biological weapon threat to U.S. military forces. To counter this threat, the Secretary of Defense announced in December 1997 a plan to immunize all active and reserve military personnel with a licensed anthrax vaccine. The Secretary stipulated that immunizations would not begin until DOD (1) established a means of testing the vaccine over and above tests required by the Food and Drug Administration (FDA), (2) developed a system for tracking vaccinations, (3) approved operational and communication plans for the vaccination program, and (4) had an outside expert review the health and medical aspects of the program. In May 1998, the Secretary announced that his conditions had been met, and in August 1998, DOD began immunizations, giving first priority to personnel deployable to southwest and northeast Asia, areas where U.S. forces are considered at high risk of exposure to anthrax.

The vaccination program has been the subject of increasing controversy. Public debate has centered on whether the vaccine is safe and effective, and whether it is prudent to rely on only one vaccine manufacturer. Since the Secretary's announcement, we have reviewed various aspects of the program. In April 1999, we testified on research on the vaccine's safety and efficacy, noting the lack of studies on long-term safety and on human efficacy testing against inhaled anthrax.[1] In June 1999, we reported on DOD's financial relationship with the sole-source vaccine manufacturer

[1] *Medical Readiness: Safety and Efficacy of the Anthrax Vaccine* (GAO/T-NSIAD-99-148, Apr. 29, 1999).

and attributed the manufacturer's serious cash-flow problems to an overly optimistic business plan.[2] The following month, we reported that DOD's data on adverse reactions resulting from vaccinations indicated that female servicemembers reported such events in greater numbers than male servicemembers and that no studies had been done to determine the optimum number of doses of the vaccine.[3] We also noted that DOD had conducted some research on a second-generation anthrax vaccine but considered such research an unfunded requirement and that the Department of Health and Human Services had recently funded several research grants to develop a second-generation vaccine.

Although the policy to vaccinate the entire force has been questioned, our review focussed on the implementation of the vaccination program as established by DOD. Given the program's scope, DOD's poor medical record-keeping during the Gulf War, and serious previous shortcomings at the vaccine manufacturing facility, you asked us to review DOD's implementation of the vaccination program as it is currently structured. Specifically, as you requested, we assessed DOD's

- ability to maintain an adequate supply of anthrax vaccine for its immunization schedule,
- system for recording and tracking servicemembers' vaccinations,
- efforts to monitor possible adverse reactions to anthrax vaccinations, and
- steps to educate servicemembers about the program.

To assess the vaccine supply, we reviewed the quantity of vaccine in stockpile, the status of efforts to test the stockpiled vaccine, and schedules for producing new vaccine. To assess DOD's tracking of servicemembers' vaccinations, we compared electronic and paper records of vaccinations at four locations (one per service). To assess tracking of adverse reactions, we evaluated DOD's data on adverse reactions and interviewed medical personnel and vaccine recipients. Finally, to assess DOD's education efforts, we surveyed vaccine recipients during our four site visits and discussed education efforts with commanders and program officials. A detailed discussion of our scope and methodology is in appendix I.

[2] *Contract Management: Observations on DOD's Financial Relationship With the Anthrax Vaccine Manufacturer* (GAO/T-NSIAD-99-214, June 30, 1999).

[3] *Medical Readiness: Issues Concerning the Anthrax Vaccine* (GAO/T-NSIAD-99-226, July 21, 1999).

Results in Brief

As of July 1999, DOD had given about 1 million anthrax vaccinations to more than 315,000 servicemembers, but supply problems jeopardize its schedule for vaccinating all 2.4 million servicemembers, and DOD lacks a contingency plan in the event these problems are not resolved in time. Test failures[4] and problems in the testing itself have slowed or precluded release of 26 of the 40 vaccine lots since testing began in January 1998. In all, only 14 lots[5] have been released to DOD since January 1998, and most of these have already been used. Moreover, the manufacturer has yet to receive FDA permission to release lots produced after restarting operations in May 1999 following a 17-month shutdown for renovations. As a result, DOD has fallen behind its original schedule by 5 months, and it risks further disruption if more vaccine does not become available by August 2000. DOD's plans for maintaining an adequate supply of vaccine are optimistic, given testing problems, and assume that FDA will grant approval of tested lots in less time than in the past. Consequently, DOD may not be able to augment its stock of usable vaccine as currently planned. The manufacturer's financial problems, which had threatened vaccine supply, have been recently mitigated by a renegotiated contract, but financial concerns could re-emerge if there are further delays in releasing vaccine. Although DOD has considered options, should the vaccine manufacturer have further delays in or lose its ability to produce FDA-approved vaccine, DOD does not have a formal contingency plan to deal with such possibilities.

DOD has a new recording and tracking system for vaccinations that is better than the one used during the Gulf War and in Bosnia, but DOD is not meeting its requirement to record vaccination data consistently in paper records and in its central database. Our comparison of records from DOD's central database and files at three military installations showed that 85 to 97 percent of paper and electronic records agreed on the number of anthrax vaccinations given to servicemembers, but agreement was lower at two of those sites—ranging from 17 to 69 percent—for dates and lot numbers. Agreement in all categories was much lower at a fourth installation, with match rates of 8 to 22 percent, in part because individuals' duty stations had not been updated. This data is vital for (1) scheduling the

[4]Before some of the stockpiled lots can be released, FDA must approve the results of its required lab tests. Other stockpiled lots received FDA approval some years ago but must now pass supplemental tests before DOD can use them.

[5]Each lot includes roughly 200,000 doses.

FDA-licensed regimen of six vaccinations and boosters and (2) tracking who receives vaccinations from a specific lot, should health concerns about a lot later emerge. Delays in updating data on individuals' duty stations have impeded DOD's ability to use its central database to manage vaccination schedules and assess unit readiness. Commanders need updated duty station information to ensure their personnel receive vaccinations on time so that they may be ready for deployment. In addition, DOD does not collect data on those refusing vaccination or leaving the service to avoid vaccination. This leaves DOD without an important tool to gauge the extent of resistance to the program and target training resources to provide servicemembers with the information they want.

DOD has used data from the Vaccine Adverse Event Reporting System to monitor adverse reactions (or events) to anthrax vaccinations. The system relies on medical personnel or servicemembers to provide needed data. However, DOD has not systematically informed these personnel on how to provide needed data into the system. As a result, DOD may not have data on adverse reactions (or events) that is important for monitoring vaccine safety. DOD uses the number of data entries into the system to determine an adverse reaction rate. However, this data does not provide sufficient basis for reporting a reaction rate because the information is inadequate to directly link the health condition of a servicemember to the anthrax vaccination. Moreover, such events may be underreported. Further, preliminary data from DOD surveys of vaccine recipients indicates a greater rate of reaction than is indicated by the reporting system, which reported 215 adverse events after over 978,000 vaccinations as of July 1999. The reaction rates reported by DOD surveys varied (between 21 and 70 percent), in part due to methodological limitations such as lack of control groups or adjustments for factors such as physical activity and age. DOD has reported that there is no evidence of a pattern of serious, long-lasting adverse reactions.

DOD has employed a high-visibility campaign to educate servicemembers about the program and has taken steps to address the controversy surrounding the program. In addition, it recently expanded its communications efforts by updating the program's Internet site, opening a toll-free anthrax information line, and forming a speakers' bureau of anthrax experts. However, a survey we performed at four military installations, though not projectible beyond the 249 respondents, indicated that servicemembers want more information about some issues related to the program. More than two-thirds of survey respondents reported that the information they received on reasons for the program, shot requirements

and schedules, and consequences of refusals was at least moderately helpful. However, over half said they either received no information on possible long-term side effects and procedures for reporting side effects or found the information less than moderately helpful. Although many respondents wanted more information on long-term side effects, data on this topic is limited because no long-term studies have been carried out. DOD officials recently discussed conducting additional studies to increase their understanding of possible long-term health effects.

This report includes recommendations to the Secretary of Defense to develop plans in the event that the vaccine does not become available as currently anticipated, to provide guidance for the consistent reporting of adverse events, and to establish data collection measures that allow the program to monitor performance and target training and research resources.

Background

According to the Chairman of the Joint Chiefs of Staff, anthrax is the greatest biological weapon threat. DOD considers vaccination one of the measures critical to protecting U.S. forces against such weapons. As a result, it has begun immunizing all U.S. military personnel—about 2.4 million servicemembers, including all active and reserve—against anthrax. The Secretary of the Army is the Executive Agent of the program, which is being implemented in three phases to vaccinate the entire force by 2004.

- Phase 1—begun in 1998 and ongoing: 423,000 members assigned or rotating to high-threat areas have begun or will begin vaccinations.[6]
- Phase 2—slated to begin in January 2000: early deploying units—about 1 million personnel—begin vaccinations.
- Phase 3—the remaining approximately 1 million personnel begin vaccinations.

The regimen for this vaccine is an initial series of three vaccinations at 2-week intervals, followed by a series of three vaccinations at 6-month intervals, with annual boosters thereafter.

[6]DOD had planned to begin vaccinations in southwest and northeast Asia in the summer of 1998. However, in March 1998, when hostilities in southwest Asia seemed likely, DOD began vaccinating personnel stationed there ahead of schedule.

Production and Testing of Anthrax Vaccine

The anthrax vaccine was licensed in 1970 to protect occupational groups such as veterinarians, meat packers, wool workers, and health officials who might come into contact with the disease primarily through the skin. Its effectiveness against inhalation anthrax in humans has not been proven, as it would be unethical to conduct such studies on humans. However, as we reported in our April 1999 testimony,[7] studies on the efficacy of the vaccine in guinea pigs, rabbits, and monkeys support the view that the vaccine can protect against exposure to inhaled anthrax in these animals, but the correlation of that protection to humans has not been established. DOD recently sought to develop an animal model to establish such a correlation.

DOD currently procures the anthrax vaccine solely from one private manufacturer, BioPort Corporation. Formerly, the facility was known as the Biologic Products Division of the Michigan Department of Public Health, then the Michigan Biologic Products Institute. The manufacturer is the only FDA-licensed anthrax vaccine manufacturer in the United States. BioPort produces the vaccine in lots individually numbered for tracking purposes. Each lot generally consists of about 20,000 vials containing 10 doses each. The lots must be tested according to standard FDA protocols for purity, potency, sterility, and safety.[8] Successful results are then submitted to the FDA for review. If the test results satisfy FDA, it assigns each approved lot an expiration date and notifies the manufacturer that the lot can be released for use.

This vaccine has a 3-year shelf life, measured by FDA from the date it passed the FDA's potency test. The manufacturer can request a 3-year extension of the shelf life by retesting for potency and submitting passing results to FDA for approval. FDA also allows retesting of lots that initially fail potency tests, provided the reason for the failure is investigated and explained and the retested vaccine meets appropriate standards. Once a

[7] *Medical Readiness* (GAO/T-NSIAD-99-148, Apr. 29, 1999).

[8] According to the Code of Federal Regulations (21 C.F.R. section 600), purity is the relative freedom from extraneous matter in the finished product; potency is the specific ability or capacity of a product as indicated by appropriate laboratory tests or adequately controlled clinical data; sterility is the freedom from viable contaminating microorganisms; and safety is the relative freedom from harmful effects to persons affected, directly or indirectly, by a product when prudently administered, taking into consideration the recipient's condition at the time.

vial of vaccine is labeled for shipment, its expiration date is changed to a maximum of 1 year (not to exceed its 3-year shelf life).[9]

In March 1997, the FDA cited the manufacturer for repeated deviations from applicable standards. According to DOD, in January 1998 the manufacturer stopped production as part of a previously scheduled renovation plan to support the production, testing, and stockpiling of the anthrax vaccine. These renovations were largely funded by DOD. When the manufacturer suspended production, it still had 40 lots of anthrax vaccine stored at its plant. Of these, 31 had already passed all the tests and had received FDA approval for release.[10] Nine had not yet been tested. DOD decided to subject the 31 approved lots to a series of supplemental tests for purity, potency, sterility, and safety as a prudent safeguard.[11] DOD contracted with an independent firm to oversee the supplemental tests, which were conducted by BioPort. DOD also decided that the remaining nine lots would not need to undergo supplemental testing, as these had never been released and would be undergoing FDA-mandated testing for the first time.

BioPort resumed production of vaccine in the renovated facility in May 1999. As part of its effort to receive FDA approval of its renovations and operational changes, BioPort must submit test data to demonstrate that the lots produced are consistent with each other and with anthrax vaccine previously produced in the old facility. Once these new lots, called consistency lots, pass the FDA tests, and once FDA, upon inspecting the facility and operations and reviewing the test results, approves the renovations and consistency lots, BioPort will be permitted to resume full commercial operations—i.e., sell its newly produced vaccine. Without

[9]In April 1999, 59 Marines were notified that they had received vaccine three weeks after its expiration date. Both the FDA and the Armed Forces Epidemiological Board determined that there was no concern over the safety or effectiveness of the vaccine. Those notified were nonetheless given an option of receiving an additional vaccination if they had concerns about the vaccine's efficacy. The Marine Corps followed up with a message reminding Marine commanders of the procedures for checking expiration dates on all vials of vaccine. Further, refresher training was implemented at the base in question and was strongly recommended for other medical units.

[10]At the start of the program in March 1998, some of these 31 lots contained fewer than 20,000 vials because of previous commercial sales and military use.

[11]As we noted in our April 1999 testimony, quality cannot be guaranteed from final tests alone, only from a combination of in-process tests, end-product tests, and strict controls of the entire manufacturing process.

FDA's approval of its renovations and successful completion of tests on consistency lots, however, Bioport can produce vaccine but cannot release it for use.

Packing and Shipping the Vaccine

DOD manages the transport of anthrax vaccine from BioPort to initial military recipients. To obtain its goal of zero defects and to maintain vaccine accountability, DOD and BioPort designed a packing and shipping protocol that maintains the temperature-sensitive vaccine within a constant temperature range during transport.[12] Most anthrax vaccine is shipped via commercial carriers. It is packaged in temperature-monitored boxes for domestic shipments and in refrigerated containers for international shipments. Appendix II describes the packing and shipping protocol.

Recording, Tracking, and Reporting Immunizations

As of July 1999, DOD had given about 1 million anthrax vaccinations to over 315,000 servicemembers. To meet the requirement for a system to track servicemembers receiving anthrax vaccinations, DOD's Defense Manpower Data Center added anthrax data fields to an existing DOD-wide database of personal, service-related, benefits, and residence information. This database, the Defense Enrollment Eligibility Reporting System (DEERS), now includes fields to record, among other things, the date and lot number of each anthrax vaccination given to each servicemember. Also, each service developed its own interim database to fully document vaccination information at locations where vaccinations are performed and to electronically send the information to DEERS, the central repository for such information.[13] DOD planned to use an upgrade of its Composite Health Care System to replace the interim service-specific tracking systems. Both the service interim systems and DEERS were designed to be used by unit commanders to ensure that their personnel receive their vaccinations according to schedule and by the services to report vaccination rates in their joint monthly readiness reports.

According to the services' implementation guidelines, vaccination information is to be recorded on two paper forms—the servicemember's

[12]In June 1998, on the basis of temperature testing, BioPort increased the temperature range for safe shipment of the vaccine from 2° to 8° Celsius to 1° to 25° Celsius.

[13]The Marine Corps uses the Navy's database.

medical record and form PHS-731, commonly known as the yellow shot record. The medical record is the property of the government, and the yellow shot record belongs to the individual. Procedures for yellow shot records varied at the installations we visited. For example, at the Air Force location, servicemembers were not given their vaccination unless they had their yellow shot record, while other locations did not have this requirement. Planning guidance issued by the Joint Staff also required the Joint Staff Inspector General to review compliance with requirements to document anthrax vaccinations. The review includes a random sample of medical records for personnel who received vaccinations between March and August 1998. The Inspector General's review was assigned in May 1998, and a report is scheduled to be issued later this year, but preliminary results were not yet available at the end of our review.

Tracking Adverse Reactions to the Vaccine

DOD submits data on adverse events temporally associated with the anthrax vaccine to the Vaccine Adverse Event Reporting System (VAERS). VAERS is a passive surveillance system, meaning that it alerts FDA and the Centers for Disease Control and Prevention of adverse events that may be associated with licensed vaccines through information voluntarily reported by health care providers, patients, or families. VAERS also serves as a warning signal for detection of previously unreported, unusual adverse events and/or unexpected increases in reported events. A panel of experts commissioned by the program reviews all VAERS reports after they have been submitted to FDA to identify any signaling event that would identify problems stemming from the anthrax vaccine. As of July 1999, the panel had found no pattern of causality stemming from the use of the anthrax vaccine.

Supply Problems Jeopardize DOD's Vaccination Schedule

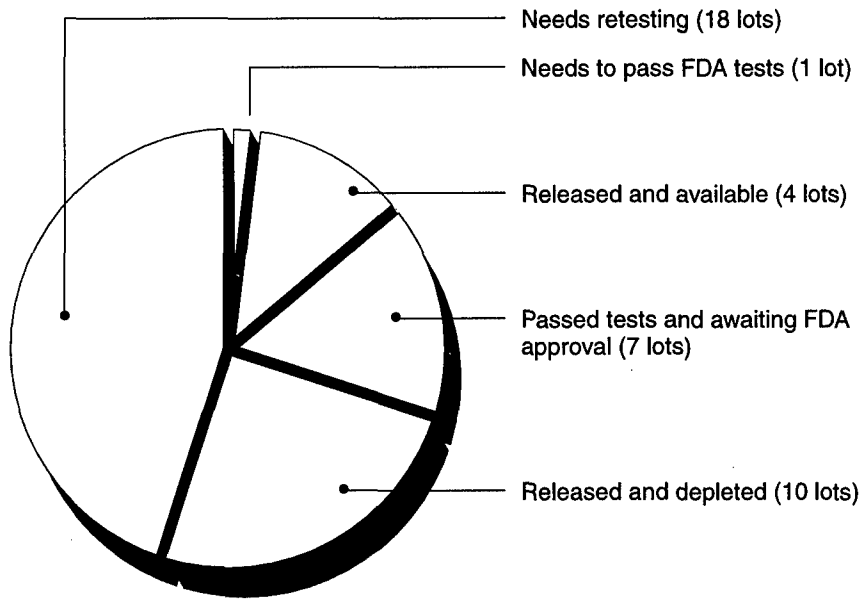
The most critical component of the program, an adequate supply of vaccine, is threatened by testing delays and possible loss of production capability. Testing problems have already delayed release of stockpiled vaccine,[14] many lots of which are still unavailable for use. BioPort has also fallen behind schedule in submitting to FDA test results on the lots produced after it resumed operations in May 1999. If testing problems are not resolved soon, or if FDA withholds approval of BioPort's renovations or newly produced lots, DOD will have difficulty in (1) providing phase 1 vaccinations beyond August 2000 and (2) beginning phase 2, which has already been delayed 5 months. BioPort also faces financial problems and some security weaknesses that put the supply of vaccine at risk. On the positive side, the program has nearly eliminated loss of vaccine in transit to the field thanks to a highly successful shipping and packing system. However, despite the risks to the vaccine supply, DOD has not prepared a formal, written contingency plan for vaccinating servicemembers should a steady supply be further delayed or disrupted.

Testing Problems Have Delayed Release of Vaccine

As of June 23, 1999, 26 of the 40 stockpiled vaccine lots were still not available for use (see fig. 1). Most of these—18 lots—had undergone but not passed all the supplemental tests or had to be retested. An additional lot needed to pass FDA-mandated tests. Seven other lots passed supplemental or FDA tests but had not yet received FDA approval. In all, of the original 40 lots, only 14 had been released for use since the program began, and 10 of these had been depleted.

[14]Although the original stockpile contained 31 lots, we use the term "stockpile" to refer to all anthrax vaccine—40 lots in all—stored at BioPort before production restarted in May 1999.

Figure 1: Status of Testing for 40 Lots Produced Prior to Shutdown for Renovations



DOD data as of June 23, 1999

When supplemental testing began in January 1998, program officials expected to receive the first positive results by April of that year. However, problems with testing processes, failure of vaccines to pass tests, and limited testing resources delayed or precluded the release of 18 lots. All 18 lots have passed safety tests but have at least one unresolved issue with purity, potency, or sterility.

- Nine lots failed purity tests because the amount of preservative used in the vaccine did not meet FDA standards.[15] DOD is considering permanently removing these lots from the stockpile, given the time and resources it would take to resolve the issue.

[15]BioPort has discussed with FDA completing studies that would enable the manufacturer to request FDA approval of release of those lots with less preservative (phemerol) than currently required. If these studies show that lower amounts of the preservative are effective, and if FDA, after reviewing the data, approves lowering the standard, DOD may be able to use some or all of these nine lots.

- Three lots initially failed sterility tests, then passed them, but FDA cited serious concerns about the lots. According to program officials, the lots will probably not be retested and will likely be withdrawn from the stockpile.
- Fourteen lots still need to pass potency tests. For two of these, test results were invalid due to problems in the test procedures, causing BioPort to suspend all further potency tests until the problems were resolved. At DOD's request, an outside scientific team reviewed the test procedures and recommended several corrective measures.[16] BioPort adopted the team's recommendations, which took several months to implement. In all, most potency testing was delayed 6 to 9 months. The remaining 12 lots have undergone valid testing but have not passed it.

Table 1 summarizes the tests needed for the 18 lots that have not yet passed supplemental testing.

Table 1: Status of 18 Stockpiled Lots Subject to Supplemental Testing

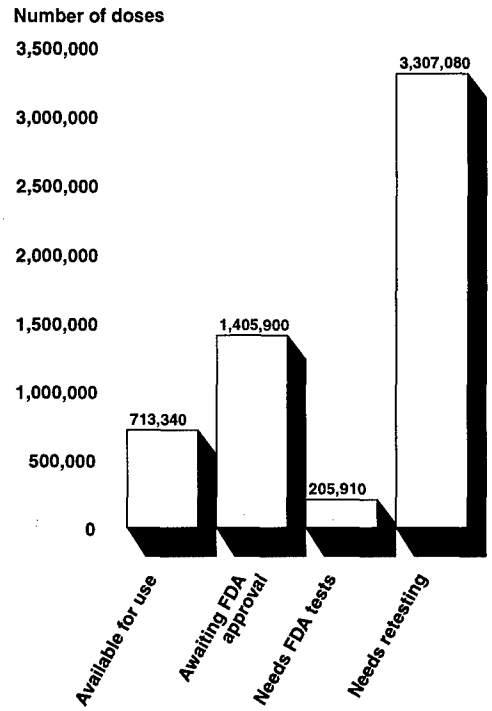
Supplemental tests needed	Number of lots
Potency	6
Potency and sterility	3
Potency and purity	5
Purity	4
Total	**18**

Source: DOD.

Although testing is performed by lots, vaccination schedules are predicated on the number of doses available. To understand the implications of these testing problems for DOD's vaccination program, therefore, it is necessary to assess available doses—especially because the number of doses in a lot varies. As of June 23, 1999, 5.6 million doses remained in the stockpile at BioPort, but 4.9 million (88 percent) of these were unavailable for use (see fig. 2).

[16]The team suspected but could not confirm that at least some of the variances were due to changes in (1) the size, age, and sex of the test subjects (guinea pigs); (2) a saline solution used in the tests; and (3) the strain of anthrax used in the control group.

Figure 2: Status of Doses Remaining in Stockpile



Note: Does not include almost 2 million doses that have been released and shipped to installations.

- More than 3 million doses cannot be released unless BioPort retests its lots, achieves successful results, and receives FDA approval to release them. According to program officials, lots containing a total of over 2.2 million of these doses are not likely to be ever retested due to the aforementioned purity and sterility test results.
- More than 1.4 million doses unavailable to DOD are awaiting FDA approval of successful testing, and program officials expected to successfully test and request FDA approval for an additional almost 206,000 doses needing FDA tests before October 1999.

In summary, as of June 23, 1999, only 713,000 doses in the stockpile were available for use, and more than half of them—about 416,000 doses—will expire in February and April 2000. On the basis of DOD's estimates of doses required per month, the 713,000 doses would sustain phase 1 of the program through December 1999. This estimate does not include doses

already delivered to the field and not yet administered. However, typically, no more than a 3-month supply of vaccine is delivered to a location, which means that the program could be sustained at best through March 2000, on the basis of both delivered and available stockpiled vaccine doses.

Program officials are not concerned about the status of the stockpiled vaccine. At the time of our review, they expected FDA to grant release of stockpiled lots containing a total of 1.6 million doses before October 1999, and they projected this would sustain the program through August 2000. This expectation assumes a quick and positive response by FDA. Program officials also expected to retest and submit some other lots in early 2000. However, this expectation seems optimistic. According to these same officials, BioPort's limited testing resources, overburdened by competing demands, are now being concentrated on obtaining FDA approval of renovations. Consequently, performing more supplemental tests is a far lower priority for both BioPort and DOD.

BioPort Renovations Are Behind Schedule and Have Delayed the Program's Second Phase

A 5-month delay in completing renovations caused BioPort to delay production startup from January 1999 to May 1999. This delay, coupled with testing problems and workload, have in turn delayed production and approval of vaccine consistency lots. Indeed, BioPort has not yet performed FDA-mandated testing on any of the consistency lots, and as a consequence, no test results have been submitted to FDA for approval.

In late July, program officials expected BioPort to submit successful results for the first consistency lots by September 1999 and expected FDA to approve renovations, which involves an inspection of the facility, and permit release of these lots by January 2000. This would allow the program to begin its second phase 5 months after its scheduled August 1999 starting date. Although BioPort officials say they are coordinating more closely with FDA now, this expectation seems optimistic. FDA is required to review and provide a response to the manufacturer regarding test results within 4 to 6 months, but approval is not automatic. Our analysis of past test approval periods for potency tests of stockpiled lots,[17] showed that the time from successful test completion to FDA approval has averaged 10 months. This period, which includes any delays between test completion

[17]The period measured was from the date the manufacturer completed lot potency tests to the date FDA approved the results of those tests. BioPort needs approval of potency test results as well as approval of its renovations which are separate FDA approval processes.

and the manufacturer's submission to FDA, ranged from 2 to 29 months and lasted more than 8 months for almost half of the lots analyzed. Should FDA question the test results or raise other production issues, release of new production could be delayed beyond January 2000. Indeed, FDA concurs that this date for approval of renovations and release of lots is optimistic.

BioPort's Finances and Physical Security Could Threaten Vaccine Supply

Although somewhat mitigated by recent contract renegotiations, BioPort's financial problems have reduced the program's vaccine supply in the short term and may threaten future supplies altogether if production does not resume. BioPort must improve its financial health if DOD is to retain this sole source of anthrax vaccine. In June 1999[18] we testified about several problems at BioPort: (1) renovation delays reduced expected revenues, causing a serious cash-flow problem; (2) the company lacked the cash reserves and the ability to obtain commercial financing at reasonable rates to cover operating expenses; (3) its accounting system was inadequate; and (4) the company projected a significant operating loss for the year ending December 1999. As a short-term measure to generate revenues to improve its financial health, BioPort received authorization from DOD to sell 70,000 doses of anthrax vaccine to other customers,[19] even though it was not fully meeting its contractual delivery requirements at the time. This action diminished the potential supply available to U.S. forces. Moreover, on the basis of renegotiation of its contract with DOD, BioPort (1) will provide DOD with fewer doses of the vaccine than its original contract stipulated to better reflect its production capabilities and (2) will be permitted to increase its private sales to increase revenues. DOD officials stated that this reduced availability will still meet the program's needs.

Although not as pressing as its financial problems, the physical security of BioPort's facility presents some risk to the vaccine supply. In 1998, the Defense Special Weapons Agency reviewed security at what was then the Michigan Biologics Products Institute and recommended numerous physical and operational measures to correct weaknesses. BioPort implemented many of these, including improvements of doors, locks, and fences, but rejected other measures it considered "beyond the scope of a

[18] *Contract Management* (GAO/T-NSIAD-99-214, June 30, 1999).

[19] BioPort sells these doses at a significantly higher price than the DOD contract price. DOD has approved the sale of 30,000 doses to the Canadian Armed Forces, and BioPort intends to sell the remaining 40,000 doses to other potential customers. These sales would also require approval under export control regulations.

biotechnology business." These included such measures as increasing surveillance and modifying existing structures. According to BioPort, if DOD considers further security measures important, it must also consider funding them. In the opinion of DOD's program officials, most of the remaining security recommendations are relatively minor in nature and of less concern than BioPort's production problems. DOD is determining the most effective means of addressing and funding any high-cost security measures at BioPort. At the time of our review, however, DOD did not have plans to implement these measures. Absent a specific implementation plan, it is unclear when or if these security weaknesses would be addressed.

Well Designed and Administered Packing and Shipping Eliminate Vaccine Losses in Transit

DOD and BioPort have worked closely together to solve the challenges of shipping the temperature-sensitive anthrax vaccine to all sorts of climates in all types of weather. Although a transport problem in the first shipment of vaccine (to a U.S. base in Germany) led DOD to destroy 20,000 vials rather than risk distributing vaccine that had been subjected to below-standard temperatures, the program has had extremely few losses since. Learning from this incident, program officials and the manufacturer developed a packaging protocol that maintains a safe temperature range that is continuously monitored from within the container. They also devised a shipping system that uses commercial carriers and constantly tracks packages in transit. Shipments are kept small to limit loss from misplacement or deliberate destruction. According to the program's data, 99.8 percent of all shipped vials arrived safely after the new procedures were implemented.[20] Given this excellent record, DOD is adapting the program's shipping protocol for other environmentally sensitive pharmaceuticals that it manages.

DOD Lacks Contingency Plans for Disruption or Loss of Production

Program officials acknowledge that BioPort has had testing, production, financial, and security problems, but they have developed no formal contingency plans to ensure that vaccinations continue if the supply of vaccine is disrupted or lost. These officials believe that enough stockpiled lots have been released to maintain phase 1 through August 2000. However, implementation of phase 2, which depends on new production and release of vaccine, has already been postponed by 5 months to January 2000, and

[20]This excludes the first shipment of 20,000 vials (464 vials destroyed of 197,487 shipped as of July 2, 1999). Including that first shipment, the program's total success rate is still 90.6 percent of shipped vials and 99.2 percent of all shipments.

even this new date may be unrealistic. If the testing and other problems continue to delay vaccine production and release, DOD will find it difficult to provide vaccinations in the latter part of 2000 and beyond.

Program officials have considered how to adjust for limited delays in releases of the current supply, but they have no formal back-up plans in case of major delays in release of new lots. Several alternatives to the current phase 1 schedule may be possible, should BioPort be seriously delayed in obtaining FDA approval of its renovations. These alternatives range from redistributing vials already sent to the field to suspending all further vaccinations except for forces in the highest-risk theaters. However, program officials could not provide formal criteria for implementing various alternatives, nor could they cite measures of potential advantages such as how long a specific alternative might extend the program or how many personnel it might maintain.

The program also has no contingency plan should BioPort lose its production capability outright, either through FDA rejection of its renovations, financial failure, or destruction by natural catastrophe or hostile agent. Program officials did consider construction of new and completely redundant production facilities, but this alternative was seen as too costly and time-consuming. As we noted in an earlier report, development of a second-generation vaccine that may provide other manufacturing alternatives has begun, but DOD research in the area remains unfunded.[21] The Department of Health and Human Services recently funded several research grants in the area. However, licensing a new facility or developing a second-generation vaccine would take several years—too long to offset any major loss of production by BioPort during the program's timeline. At present, DOD has no means of continuing immunizations with anything other than what is available from the BioPort stockpile, most of which still needs to pass tests before it can be used.

[21] *Medical Readiness* (GAO/T-NSIAD-99-226, July 21, 1999).

Recording and Tracking Vaccinations Has Improved, but Further Improvements Possible

DOD is more capable of recording and tracking vaccinations today than it was during the Gulf War in 1991 or the Bosnia operations in 1995. However, DOD is not meeting its requirement to consistently record vaccination data in its centralized database and paper records. Such inconsistencies could cause vaccinations to be given off schedule or hinder subsequent investigations should questions arise about a specific vaccine lot. Also, delays in updating data on servicemembers' duty stations, as well as shortcomings in how the services update the DEERS database, have limited the utility of the database for determining individual vaccination schedules and assessing unit readiness. While DOD tracks vaccination exemptions (including waivers and deferrals) for medical reasons such as pregnancy or administrative leave, it does not monitor refusals or voluntary departures from the service that may be due to vaccine-related concerns. As a result, DOD is not able to use the information to monitor all aspects of the program's implementation.

Vaccinations Recorded, but Some Data Is Incomplete

The Gulf War and the concerns it subsequently generated about Gulf War illnesses highlighted shortcomings in DOD's systems for recording and tracking medical data, including vaccination records. In 1997, we reported that DOD had improved its medical surveillance during operations in Bosnia but that documentation of vaccinations was one area still needing improvement.[22]

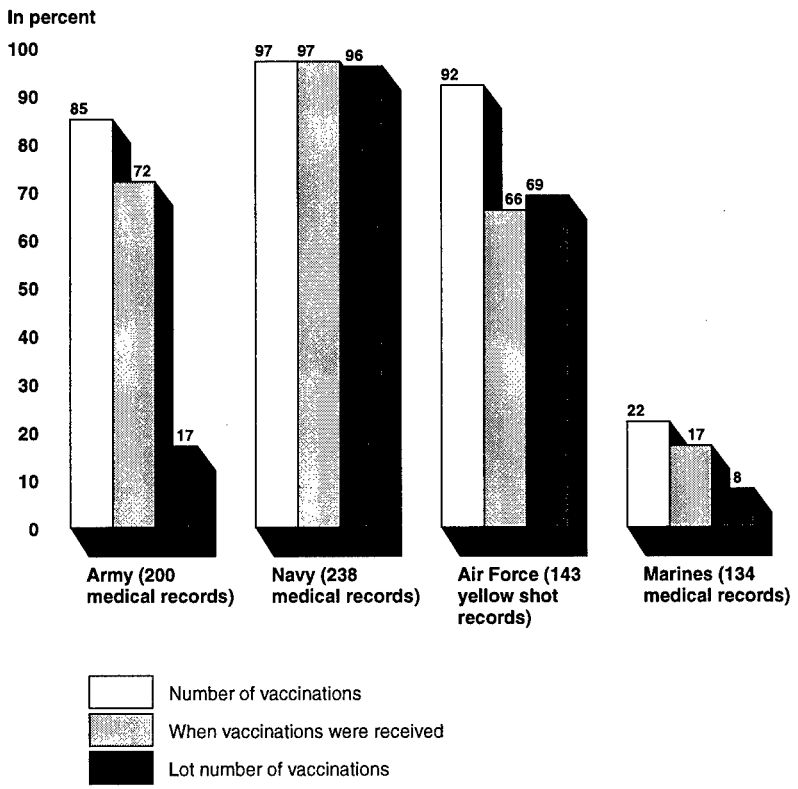
In following up on this deficiency, we found that DOD has improved its ability to record and centrally collect vaccination information. Our comparison of DEERS data and paper medical records at four military installations[23] (one per service) indicated that, except at the Marine Corps installation, the numbers of vaccinations were recorded consistently.

[22]*Defense Health Care: Medical Surveillance Improved Since Gulf War, but Mixed Results in Bosnia* (GAO/NSIAD-97-136, May 13, 1997). Our comparison of a centralized list of vaccine recipients with their medical records in five units revealed that vaccinations had not been recorded in 24 percent of medical records. Three of the five units failed to record vaccinations in more than 30 percent of medical records.

[23]We visited one location per service where a large number (more than 1,000) of vaccinations had been given: Fort Stewart in Hinesville, Georgia, for the Army; the USS Eisenhower, Norfolk Navy Shipyard, Portsmouth, Virginia, for the Navy; Langley Air Force Base, Hampton, Virginia, for the Air Force; and Camp Lejuene, Jacksonville, North Carolina, for the Marine Corps. Our sample of records cannot be generalized. See appendix I for more information on our scope and methodology.

However, agreement between the two systems was not as high when matching specific dates of vaccinations and vaccination lot numbers. Inconsistency in dates could lead to vaccinations being given off-schedule and to inaccurate readiness reports. Inconsistent or missing lot information could hinder investigations, should concerns arise about a specific lot. Also, information that is not recorded in paper records makes it difficult to address adverse reactions needing immediate care or determine the validity of subsequent claims for disability compensation. Figure 3 summarizes the agreement between electronic and paper information on vaccinations by service.

Figure 3: Comparison of Paper and DEERS Records



Source: GAO.

We made the following observations:

- The Army base's low match rate for lot numbers was due to the fact that lot numbers were not recorded in the medical records for about 60 percent of vaccinations. Despite this omission, the base did record lot numbers in DEERS, and only 1 percent of vaccinations recorded in DEERS were without lot numbers.
- The fact that almost all ship personnel received vaccinations on the same days while deployed at sea contributed to the high match rate between DEERS and medical records on the Navy vessel.
- As shown in figure 3, unlike the other installations we visited, the Air Force base relied primarily on the yellow shot record, not the medical record, for recording vaccinations on paper. Less than 5 percent of vaccinations, dates, or lot numbers in the medical records matched information in DEERS. Officials at the site said the yellow shot records were smaller and therefore easier to carry on deployment. However, unlike the yellow shot record, the medical record is government property and should be complete because it serves as evidence for determining veterans' disability compensation. The commander of the medical group at the base told us he planned to have the information in the electronic records printed and entered in the medical records, but this had not been done at the time of our review.
- Marine Corps officials were unable to provide specific reasons for the low match rate with DEERS but noted that (1) neither DEERS nor the Navy database are optimized to handle the frequent changes in units of the Marine Corps–as a result, DEERS did not list all the Marines deployed at Camp Lejeune; (2) lack of training on the Navy database–introduced to the Marine Corps in March 1998, the same month that anthrax vaccinations began–could have contributed to inconsistencies; and (3) the Navy system uses the date the vaccinations are entered into the system as the default, causing inaccuracies if vaccinations are not entered into the system the same day they are given.

Services' Use of DEERS Limits Its Utility

DEERS was envisioned as a major source of reports on program implementation. However, concerns about the timeliness and accuracy of data in DEERS have caused service representatives to rely on interim, service-specific tracking systems, and other systems to track and report vaccination information. For example, Army and Navy officials said they had concerns about DEERS data because duty station information was not updated, in some cases for as long as 6 to 9 months, in DEERS.

Problems we encountered obtaining medical records for our review also demonstrated some of the weaknesses in duty station information. For example, we found that DEERS did not list all servicemembers assigned to a particular duty station. We obtained personnel rosters for Fort Stewart and Camp Lejeune from Army and Marine Corps personnel databases. We compared a sample 300 records from these two lists with the DEERS roster of servicemembers assigned to the two duty stations and found that the DEERS database only listed 210 (70 percent) of Fort Stewart personnel and 111 (37 percent) of Camp Lejeune personnel.

Army and Air Force officials told us they rely on service-specific tracking systems rather than DEERS to obtain more timely information for both day-to-day management of vaccinations and quarterly servicewide readiness reports. Navy and Marine Corps officials told us that because of shortcomings in the Navy tracking system, they rely on reports from individual commanders to manage and obtain servicewide data. Officials from all four services and the program noted that since the start of the program, service-level systems have improved and are more responsive to commanders' reporting needs.

According to Defense Manpower Data Center (DMDC) officials, delays in updating DEERS are caused partly by service personnel systems not providing timely data to DEERS. In May 1999, the officials told us they and the services had taken steps to update duty station information more promptly. We were unable to test the effectiveness of these changes because they were instituted after our analysis. DMDC officials also noted that some data inconsistencies and delays in resolving errors could have been avoided if the services had followed the original design of the tracking system, which allows medical providers to be linked directly to DEERS through their service-level systems. Such direct linkage (1) ensures that servicemembers' vaccination records are updated regardless of whether they are vaccinated by their own or another service and (2) minimizes the impact of mistakes (such as entering the wrong social security number or recording the same vaccination twice) by providing immediate feedback to the user in case of error. However, the Army and Navy have adopted systems that do not directly link to DEERS. Instead, Army, Navy, and Marine Corps data are transmitted to central servers in their service-specific systems, which then upload the data to DEERS. This can cause delays in correcting errors. DMDC officials reported that the Air Force, thanks to its direct linkage to DEERS, receives far fewer error messages and has to do fewer follow-ups than the other services. DMDC

produces lists of errors each day but has not analyzed how frequently different errors occur.

DOD plans to eventually transition the service-specific databases to a common system. It has begun testing and in 2000 will install the Composite Health Care System II (CHCS-II), which, among other things, is designed to interface with DEERS for updating vaccination data. According to DMDC officials, the system will ensure consistent data quality across services. However, it is unclear when the services will abandon their interim, service-specific databases in favor of CHCS-II. Service officials said they were reluctant to move to the new system because it will rely on DEERS for vaccination and duty station data and will not be under the control of the individual services for program upgrades. Moreover, CHCS-II is not intended for use by deployed units, so it cannot be used on locations such as Navy ships. DOD has established a team with representatives from all services that meets regularly to address problems associated with vaccine tracking systems.

Goal Performance Measures Do Not Include Exemptions and Refusals

DOD set a timeliness goal of vaccinating 90 percent of all servicemembers no more than 30 days after their vaccinations are due according to the licensed regimen.[24] As of July 1999, all services (except the Army) had met or exceeded that goal. The Army had a 78-percent compliance rate at that time. The data used to calculate the percentage of "on-time shots," however, does not include exemptions or refusals.

Servicemembers can receive exemptions from vaccinations for medical reasons (e.g., pregnancy) or administrative reasons (e.g., extended leave to change duty stations). Exemptions accounted for about 5 percent or less of those who received at least one injection, according to service officials. As for refusals, the program collected anecdotal data on refusals until January 1999, but the effort was labor-intensive because it entailed surveying individual commanders. Due to the small number of refusals–82 after almost 172,000 servicemembers had received one or more injections–senior Army officials decided the effort was not productive and halted data collection. Moreover, reports of refusals did not list personnel who

[24]DOD's policy is to adhere to the approved immunization schedule and to make deviations to the schedule the exception rather than the rule. According to DOD policy, the effect of deviations from this schedule on the efficacy of the vaccine is unknown, but in general, the greater the deviation, the less certain the protective effect in humans.

voluntarily left the services due to concerns about the vaccine. Although the refusal number at the time may have been low, lack of data limits the program's ability to gauge the effectiveness of its education efforts and to effectively respond to any increase in opposition to the vaccine.

According to written guidance from the Army and Navy and our discussions with Air Force and Marine Corps officials, servicemembers who refuse vaccination are initially provided additional education. Servicemembers who continue to refuse are given a direct order, which, if disobeyed, can lead to disciplinary action–including discharge–at the commander's discretion. The Air Force, the only service with a database to track such information, plans to collect data on disciplinary actions taken against those who refuse vaccination, but it has not yet begun to do so. A provision in the National Defense Authorization Act for Fiscal Year 2000 requires an exit survey of all servicemembers leaving military service to collect data on, among other things, their reasons for leaving.[25] This is also a potential source of anthrax refusal data.

Possible Adverse Events Are Monitored, but DOD's Use of Data May Be Misleading

DOD monitors possible reactions (or adverse events)[26] to anthrax vaccinations primarily by using VAERS. However, reports of such events may be incomplete because servicemembers have not been fully informed about reporting procedures. Moreover, DOD has used the VAERS data to report a rate of reaction to the vaccine. This is misleading because of potential underreporting of events to VAERS, and the potential for overstating the reaction rate because reports sent to VAERS are not confirmed to be causally linked to the vaccination. Preliminary data from DOD studies of adverse events indicates a higher rate of possible reactions than is reported by VAERS, but the reporting rates in these studies varied and the studies have methodological limitations. Thus, DOD does not have reliable information on the extent of adverse reactions. DOD reported that adverse events have been few in relation to the number of vaccinations and that there is no evidence of a pattern of serious, long-lasting adverse

[25]See section 581 of Public Law 100-65, October 5, 1999.

[26]Adverse events are adverse outcomes for which a cause and effect relationship with an exposure (to a vaccine or a medication) has not yet objectively been determined. An adverse event becomes an adverse reaction once objective evidence is available to establish a cause-and-effect link between an exposure and an adverse outcome.

reactions. DOD medical personnel have drafted additional clarifying guidance on treating and reporting adverse reactions to the vaccine.

Medical Staff and Servicemembers Are Not Well Informed About Reporting Adverse Events

According to testimony by DOD officials, as of July 1999, 215 adverse events[27] had been reported to VAERS after about 978,000 vaccinations. VAERS is a so-called passive surveillance system, meaning that it relies on medical personnel or individuals to report adverse events they think resulted from a vaccination. DOD medical personnel are required to file a VAERS report for reactions that cause a servicemember either to lose more than 24 hours of duty time or to need hospitalization.[28] DOD reported, and FDA officials commented, that this requirement exceeds FDA requirements, which only require vaccine manufacturers, not physicians, to report to VAERS, though reporting by physicians is encouraged.

Nonetheless, VAERS data may be incomplete because DOD medical staff and servicemembers have not received the guidance needed to submit VAERS reports. Medical officials at a May 1999 conference convened by the program to discuss clinical issues expressed concern that they had not received clear guidance on how and when to complete VAERS forms. According to DOD officials, medical personnel may also report any other reaction they think might be caused by the vaccine, but because this is not stated explicitly in DOD's guidance on vaccinations, some medical personnel may be unsure about which reactions to report.

Servicemembers and their relatives may also report directly to VAERS any adverse events they suspect are related to a vaccine. DOD, however, prefers that VAERS reports be filed through its medical providers to ensure that data is sufficiently detailed to identify and understand trends. A program official acknowledged that anthrax vaccine educational materials initially did not explain how to self-report adverse events. Moreover, of the 249 servicemembers we surveyed,[29] 44 percent (110) told us they had received no information on how to report adverse reactions.

[27]Military medical personnel reported 109 of these.

[28]Of 174 reports reviewed by DOD, 20 met this criteria.

[29]As noted in appendix I, respondents were not randomly selected, and thus the data cannot be projected beyond those surveyed.

In April 1999, DOD updated its briefings to include information on reporting adverse events. It is also revising regulations to (1) make reporting requirements more inclusive, (2) clarify patient and provider roles and responsibilities, and (3) explain how to obtain and process VAERS forms. In addition, in July 1999, DOD disseminated draft clinical guidelines for the management of anthrax vaccine adverse events that outlines clinical protocols, pre-treatments, specialty referral processes, contraindications, categorization of local and systemic reactions and associated treatment algorithms, and directions for reporting to VAERS.

DOD Has Used Adverse Event Data Incorrectly

In presenting reaction rate data, program and DOD officials have shown reactions reported to VAERS as a percentage of all vaccinations. They did so in several briefings to GAO and congressional staff, in prepared testimony, and on the program's Internet site. However, according to FDA guidance, incidents in the VAERS database reflect a temporal, not necessarily a causal, relationship with vaccination and thus should not be used to calculate the incidence of reactions. DOD's use of such a percentage is an inaccurate representation of the true reaction rate because (1) not all adverse events prove to be adverse reactions and (2) studies have shown that reactions are often underreported in passive surveillance systems such as VAERS, though the extent of possible underreporting is unknown. As of July 1999, DOD updated its briefing information to more accurately describe adverse events reported to VAERS simply as a VAERS report rate.

Other Data on Adverse Events Varies

In studies where vaccine recipients were surveyed about their reactions to the vaccine, adverse reactions were reported at a much higher rate than adverse events reported to VAERS, though these studies have methodological limitations. A 1962 study of the vaccine indicated that mild local reactions (swelling of up to 5 centimeters) were reported in 30 percent of recipients and moderate local reactions (swelling of greater than 5 centimeters) were reported in 4 percent of vaccine recipients.[30] DOD has conducted several subsequent studies of adverse reactions using active

[30]As we testified in April 1999, data from this study was based on a different vaccine than the one eventually licensed. FDA reported that the method of preparing the licensed product was similar but not identical to the vaccine used in the study and that production changes for the licensed vaccine were "minor."

monitoring, and preliminary results vary. [31] For example, according to DOD testimony, 70 percent of respondents in a 1998 survey of 603 medical personnel who had received the vaccine reported a local reaction to the anthrax vaccine. In another 1997 study, 16 percent (81 respondents) of 508 servicemembers receiving the vaccine reported mild local reactions, while 5 percent (25 respondents) had moderate to severe local reactions. As we testified in July 1999, data from other DOD studies also indicated that women reported a higher rate of adverse reactions than men. These studies relied on self-reported data, did not use control groups, and were not adjusted for factors such as occupation, physical activity level, and age.

According to our survey, when asked if they had had any side effects due to the anthrax vaccine, 45 percent of recipients (111 respondents) reported they had,[32] and 30 percent (74 respondents) reported swelling at the injection site, the most frequently cited symptom. Of those who reported reactions, less than 5 percent (5 respondents)[33] said they had missed work or a planned activity due to the symptoms, and 13 percent (14 respondents) sought medical treatment. Further, the percentage of female servicemembers who reported side effects was considerably higher than that of male servicemembers (64 percent of the 36 women surveyed against 42 percent of the 210 men surveyed).

On August 24, 1999, the program convened a team of civilian and military experts to design a set of studies to assess the long-term safety of the anthrax vaccine. Another long-term study is underway to determine whether individuals who received multiple vaccines, including anthrax vaccine, during their past employment at Fort Detrick, Maryland, have had any long-term health effects. A total of 570 study and control volunteers have been enrolled in this case-control study that began in 1996.

[31]In active monitoring, vaccine recipients are contacted to ascertain if there were any adverse reactions to the vaccine after vaccine administration. See *Medical Readiness* (GAO/T-NSIAD-99-148, Apr. 29, 1999).

[32]Other reactions cited by the 111 respondents included redness at the injection site (12 respondents, or 11 percent), nausea (4 respondents, or 4 percent), loss of appetite (2 respondents, or 2 percent), headaches (6 respondents, or 5 percent),and infections (3 respondents, or 3 percent). Respondents were not limited to one response.

[33]The symptoms reported by these five individuals included burning sensations, colds, need for more sleep, memory problems, fevers, headaches, nausea, lower blood pressure, viral infections, fainting spells, chronic sinus problems never previously experienced, fevers, and blood in the stools.

DOD Has an Extensive Education Campaign but Has Not Systematically Monitored the Results of Its Efforts

DOD and the services have used a variety of measures to educate servicemembers about the program and have taken steps to address controversy surrounding the program. However, many respondents to our survey indicated that they had not received information on some topics related to the program and desired additional information. The program recently established a communications division to implement plans to address the expressed desire for more information. More effective monitoring of servicemembers' understanding of the program, including the number of refusals to take the vaccine, would help DOD redirect educational efforts to those areas where additional information is needed.

Many Servicemembers Have Received Some Information but Want More on Long-term Side Effects

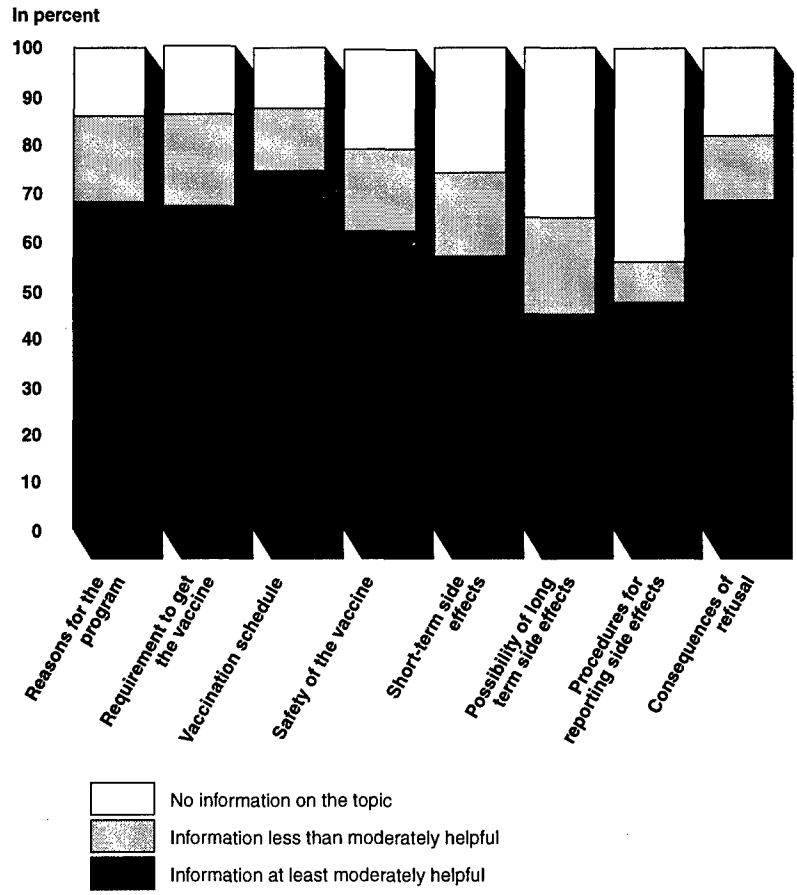
DOD and the services have made the vaccination program a high priority. At the four military installations we visited, the commanders established procedures for administering vaccinations and providing information. In addition to giving briefings and distributing pamphlets, the commanders expected health care professionals and staff to play key roles in providing expert advice to servicemembers. Further, after having briefed servicemembers about the threat of anthrax, the safety of the vaccine, and the requirement for the vaccine, commanders often highlighted the importance and safety of the vaccine by being among the first to receive it, often in the servicemembers' presence. As shown in table 2, according to our survey of 249 servicemembers (not projectible beyond those surveyed), respondents reported that command briefings and medical staff were their primary sources of information.

Table 2: Survey on Sources of Anthrax Vaccine Program Information

	Percentage of respondents reporting the following as their primary source of information				
	Command briefing	Medical staff	Radio, television. or print media	Other sources	Percentage reporting they received no information on the topic
Reasons for the anthrax vaccine program	41	19	11	15	14
Requirement for all servicemembers to get the anthrax vaccine	51	10	14	11	13
Vaccination schedule	30	47	2	9	11
Safety of the vaccine and the extent it offers protection against anthrax	20	29	9	21	21
Short-term side effects that may occur	13	38	6	18	25
Remote possibility of long-term side effects	9	23	8	16	44
Procedures for reporting side effects	16	35	1	4	44
Consequences of refusing the vaccine	54	3	14	12	16

Our survey also showed that for many topics, servicemembers found information they received at least moderately helpful, but information related to long-term side effects and procedures for reporting side effects was not as helpful to many respondents. Figure 4 shows how helpful respondents found information they received about each topic.

Figure 4: Respondents' Assessment of Helpfulness of Information



Source: GAO.

According to our survey, at least 57 percent of respondents reported that the information they received on the reasons for the program, the requirement for the vaccine, the consequences of refusing the vaccine, the vaccination schedule, the protection the vaccine offers against anthrax, and the short-term effects the vaccine may have was moderately or very helpful. There were some areas, however, where many servicemembers either received no information or desired additional information. Our survey showed that only 35 and 47 percent of respondents, respectively, said the information they received on the possibility of long-term adverse effects and on reporting adverse reactions was at least moderately helpful, and 44 percent said they had not received information on the remote

possibility of long-term side effects. Further, when asked what additional information they wanted, 43 percent (106 respondents) reported a desire for information on long-term side effects.

Many of the respondents who said they wanted information on possible long-term adverse reactions also reported experiencing some side effects. Fifty-nine of the 111 respondents (53 percent) who reported experiencing short-term reactions said they wanted information on the possibility of long-term adverse effects. Air Force servicemembers represented almost 70 percent of this group.

The wish for information on possible long-term adverse reactions was also highlighted in May 1999, when a commander temporarily halted anthrax vaccinations at Dover Air Force Base, Delaware, until he determined that servicemembers' questions on the vaccine's safety and its possible health risks had been satisfactorily addressed. The questions were spurred by a magazine article about an unauthorized additive, squalene, alleged to have been used in some vaccine lots and about the alleged relationship between the vaccine and Gulf War illnesses. Following an initial meeting at which servicemembers raised these questions but were unsatisfied with the responses, several DOD, Air Force, and Army personnel knowledgeable of the program, including the Air Force Surgeon General, provided responses in a second set of meetings. These experts reported that independent laboratory tests performed on the specific lots cited by the media had failed to find squalene. Subsequently, Dover officials resumed anthrax vaccinations. Further analysis of all of 13 additional lots also found no evidence of squalene.

Concerns similar to those expressed at Dover have been reportedly voiced at other installations. A primary reason for dissatisfaction with information about long-term side effects appears to be that research has not been done to address the topic. According to program officials, such studies have recently been discussed but are not yet funded or underway.

Program Recently Established a Communications Division

The program has recently established a communications division to focus on servicemembers' information needs. The division updated the program's Internet site and established a toll-free information line and a traveling speakers' bureau of experts on anthrax and the vaccine. The communications division was also instrumental in updating briefings for installation leaders and medical personnel to provide more detailed information on the threat of anthrax. DOD expects these briefings to

respond effectively to commanders' and medical staff's needs by countering misinformation in the media and on the Internet.

The communications division plans to periodically obtain feedback on implementation of its plan, which includes surveys carried out by DOD and service program staff while on site visits to convey key messages and ensure consistency of information. Program staff, including some from the communications division, conducted the first survey in July 1999 and plan to conduct surveys at seven other sites to be visited by December 31, 1999. The surveys will not be projectible but are expected to provide useful information on the implementation of the communications plan. In July 1999, the program submitted a budget proposal for program evaluation and research to include an annual evaluation of communications effectiveness and clinical issues. The proposal did not include linking vaccine refusals to program effectiveness.

Conclusions

DOD's policy decision to vaccinate the entire force against anthrax has presented many challenges. DOD has made progress in implementing the anthrax vaccination program, but several challenges remain. As of July 1999, DOD had administered more than 1 million vaccinations to over 315,000 servicemembers. DOD has taken steps to ensure that vaccine lots are recently tested for purity, potency, sterility, and safety before they are released for use. Vaccinations are recorded in a central database (an improvement over past record keeping); data on the program's implementation progress is collected; reported adverse events are monitored; servicemembers receive information on the program; and the manufacturer's contract has been restructured to help improve its financial condition.

The first challenge, however, is to develop a formal plan for vaccinating servicemembers should the anthrax vaccine supply not be available as currently anticipated. If BioPort, the sole-source supplier of the vaccine, is unable to obtain FDA approval to release stockpiled or newly produced vaccine, DOD will not be able to vaccinate the entire force as planned. Developing a formal plan would help DOD consider (1) various contingencies, including options for altering the three phases of the program, should the vaccine supply become limited and (2) strategies to mitigate the risk of loss of the sole-source manufacturer, including strategies to acquire a second production source or develop a second-generation vaccine.

Second, while DOD has improved its recording and tracking of vaccinations, shortcomings remain in documenting vaccinations in paper medical records and in establishing a DOD-wide database useful to commanders for tracking vaccinations. To ensure that servicemembers obtain the health care they need, especially if they experience short- or long-term adverse events associated with vaccinations, DOD must keep paper and electronic medical records accurate and current. Also, because the anthrax immunization regimen requires several vaccinations over a short period and annual boosters, it is critical that commanders have timely information about servicemembers in their units who are scheduled for vaccinations. Because the DOD-wide database, the Defense Enrollment Eligibility Reporting System, lacks current data on servicemembers' duty stations, commanders do not find it useful for scheduling individual vaccinations or determining the status of vaccinations for their unit as a whole. DOD's plan to incorporate vaccine tracking in an upgrade to its Composite Health Care System program will be of limited use to commanders if it does not give them some of the capabilities of the service-level systems.

Third, measures used to track program implementation omit important data needed to assess overall performance such as refusals. Program officials, however, have discontinued monitoring refusals, even though such data would help monitor possible lack of acceptance of the program. Moreover, previous reports of refusals did not include personnel leaving the services because of concern about the anthrax vaccine. If collected during exit interviews scheduled in 2000, this data could provide another indicator of possible resistance to the program.

Fourth, data on adverse events may be underreported, making it difficult to continuously monitor vaccine safety. DOD has updated educational material on reporting adverse events, and monitoring the effectiveness of efforts to distribute this information to servicemembers would help ensure adverse events are consistently reported.

Fifth, servicemembers clearly want more information on the possibility of long-term side effects. Because the vaccination program is a mandatory, servicewide program, it is essential that servicemembers be given the fullest information possible on these side effects. Although DOD officials have recently discussed potential studies on possible long-term side effects of the vaccine, none have been designed or funded.

Finally, program officials have not systematically monitored their education efforts. Informing servicemembers about the risks of anthrax, the protection the vaccine affords, and the vaccine's safety and efficacy is critical to the long-term success of the program. While the program has provided information on some of these topics and has established a communications division dedicated to improving communications with and education of servicemembers, monitoring the effectiveness of such efforts is important for allocating education resources. Officials plan to obtain feedback on their new efforts but have not yet designed and implemented a systematic strategy to help assess overall progress in meeting communications goals. Further, because data on refusals to receive the vaccine is no longer being collected, it is difficult to better target educational efforts and address emerging concerns.

These problems need to be resolved if the program is to succeed in vaccinating the entire force against anthrax.

Recommendations

To address the challenges DOD faces in vaccinating its total force against anthrax, we recommend that the Secretary of Defense direct the Secretary of the Army, as Executive Agent for the anthrax vaccination program, to

- prepare a formal, written plan that addresses strategies to deal with (1) contingencies for vaccinating servicemembers if the supply of anthrax vaccine is not augmented with new production and (2) the risks associated with reliance on a single vaccine manufacturer;
- routinely collect and report, among other program performance measures, data on the number of servicemembers refusing to take the vaccine;
- improve DOD guidance and training on how to report adverse events to the Vaccine Adverse Event Reporting System and refrain from inappropriately using data from the system to report an adverse reaction rate;
- design and conduct a study on possible long-term side effects of the anthrax vaccine and develop a communications plan to provide servicemembers information on the status of this effort; and
- continue improvements in educational efforts by regularly surveying vaccine recipients and addressing their educational needs.

In addition, we recommend that the Secretary of Defense direct the Defense Manpower Data Center to

- assess the timeliness of personnel duty station data in the Defense Enrollment Eligibility Reporting System to determine where time lags occur in obtaining data and take or recommend steps to resolve untimely submissions,
- review service requirements for recording and tracking medical data and incorporate plans to address these requirements in future upgrades of the Composite Health Care System, and
- include the response "to avoid the mandatory anthrax vaccine" (or words to that effect) among answers to questions on the reasons for resigning from the military in the DOD-wide exit survey to be administered in 2000.

Agency Comments

In written comments on a draft of this report, DOD generally concurred with the report findings and recommendations, emphasized several areas of concern, and described recent or proposed actions to implement recommendations made in our report. DOD also provided technical comments which we incorporated as appropriate.

DOD commented that we did not fully discuss some key aspects and successes of the anthrax immunization program. For example, DOD stated that it keeps three paper records to ensure that immunizations are documented and that no other organization in the world can match this accomplishment. Our report recognizes that DOD has made improvements to its systems for recording and tracking vaccinations but notes that further improvements are needed to ensure that data are recorded in an accurate and timely manner. DOD also stated that the report, "did not mention the excellent long-term safety record of the vaccine examined over a period of 44 years." Our report notes that GAO's recent work on this issue found that data on the vaccine's long-term safety is limited. In our previous work, we found that while some studies have spanned many years, they focus on short-term reactions to the vaccine. For example, a 20-year study on reactions to the vaccine only reported on symptoms that began within 48 hours of the vaccination. Moreover, DOD has indicated that additional data on the vaccine's long-term safety would be beneficial and has established a committee to identify and plan additional research on this issue.

Finally, DOD noted several actions it has taken or plans to take to implement our recommendations such as using existing data to develop a written plan to address possible vaccine shortages and improving DOD guidance and training on how to report adverse events to the Vaccine Adverse Event Reporting System. Regarding our recommendation that

DOD use a DOD-wide exit survey to query members whether the requirement to receive the vaccine affected their decision to resign, DOD noted that it is not appropriate to single out anthrax vaccinations as a potential reason for departing the military because it is a "leading" question and would produce survey bias. Rather, DOD believes that focus groups and surveys of individuals who refuse to take the vaccine are more appropriate assessment tools. We believe that DOD should pursue other methods, such as focus groups, to determine the possible impact of the anthrax vaccine program on retention but believe that a response category about the anthrax vaccine could be included on DOD's exit survey since it will be one of many possible reasons for leaving the military.

We are sending copies of this report to Representative Bob Stump, Chairman, and Representative Lane Evans, Ranking Minority Member, House Committee on Veterans' Affairs. We are also sending copies to the Honorable William S. Cohen, Secretary of Defense; the Honorable Louis Caldera, Secretary of the Army; the Honorable Richard Danzig, Secretary of the Navy; the Honorable F. Whitten Peters, Secretary of the Air Force; General James L. Jones, Commandant of the Marine Corps and Dr. Jane E. Henney, Commissioner of Food and Drugs. Copies will also be made available to others upon request.

Please contact me at (202) 512-3958 if you have any questions concerning this report. Key contacts and major contributors to this report are listed in appendix V.

Carol R. Schuster
Associate Director, National Security
Preparedness Issues

Scope and Methodology

To conduct our review, we interviewed officials and obtained documents from the Army Office of the Surgeon General's Anthrax Vaccine Immunization Program; the Joint Program Office for Biological Defense; the Naval Medical Information Management Center; the Offices of the Judge Advocates General for the Army, the Navy, Marine Corps, and the Air Force; and the Joint Staff. We also obtained information and discussed the program with officials from the Defense Manpower Data Center (DMDC) in Seaside, California, and Arlington, Virginia; U.S. Air Force Air Combat Command, Langley, Virginia; U.S. Navy Space and Warfare Systems Command, Chesapeake, Virginia; medical and command personnel at Fort Stewart, Georgia; USS Eisenhower, Norfolk Naval Shipyard, Portsmouth, Virginia; Langley Air Force Base, Virginia; and Camp Lejeune, Jacksonville, North Carolina. In addition, we interviewed officials and obtained documents from BioPort Corporation in Lansing, Michigan; and the Food and Drug Administration (FDA) in Rockville, Maryland.

To determine the availability of the vaccine and its impact on program schedules, we reviewed and summarized data on vaccine lot status, including supplemental test results, lot quantities, lot expiration dates, and results of initial lot release testing. We analyzed assumptions of projections for vaccine production and usage and compared them with program schedules and past testing data. We also discussed measures for securing and shipping the vaccine with officials from BioPort, the U.S. Army Medical Materiel Agency, and one installation at each service.

To assess systems for recording and tracking vaccinations, we selected one installation from each service where a large number of vaccinations had been given (at least 1,000) and randomly selected 300 service members who had received at least one injection of the vaccination series.[1] We then compared the information on the paper records with data from the Defense Enrollment Eligibility Reporting System (DEERS). Table 3 summarizes the installations visited, records reviewed, and time frames of our collection of DEERS and paper data.

[1]Files for the Fort Stewart location inadvertently included the records for the first 300 social security numbers, and therefore were not random.

Table 3: Collection and Review of Electronic and Paper Records

Service location visited	Population that received at least one vaccination	Medical records reviewed	Yellow shot records reviewed	Date DEERS data was received	Date(s) paper record data was reviewed
Army: Fort Stewart, GA	8,751	200	197	1 Dec. 1998	14-17 Dec. 1998
Navy: *USS Eisenhower*, VA	2,108	238	1	2 Feb. 1999	16-17 Feb. 1999
Air Force: Langley AFB, VA	1,273	186	143	9 Nov. 1999	30 Nov. 1998
Marines: Camp Lejeune, NC	1,842	134	4	10 Mar. 1999	15-18 Mar. 1998

Source: GAO.

We compared the vaccination number, date, and lot number contained in the DEERS database with data on paper records—the medical record and yellow shot records available on site. A mismatch of any vaccination for each category was considered a mismatch for the entire record. Because our samples included only those who had received at least one injection, our analyses did not examine the possible condition that a servicemember received an injection but did not have it recorded in DEERS. Further, although our initial sample of records was designed to project our results to the installations we visited with a precision of ±5 percent at a 95-percent confidence level, operational limitations in the field—most notably the unavailability of some records because of deployments and transfers—did not allow us to review sufficient records to generalize our results to all personnel at the four installations with a reasonable level of confidence.

To evaluate the reporting of vaccine-related adverse events, we reviewed FDA requirements for the Vaccine Adverse Event Reporting System (VAERS), obtained reports of adverse events from the program, discussed reporting procedures with medical and command personnel at the four military installations we visited, and reviewed additional Department of Defense (DOD) studies on adverse events. In addition, we attended the May 1999 Annual DOD Conference for Biological Warfare Defense Immunizations.

To assess education initiatives of the program, we reviewed guidance and service plans to determine education requirements; collected and reviewed educational material used at the military installations we visited, discussed education efforts with command and medical personnel at each installation and with FDA officials, and surveyed a total of 249 servicemembers at those installations. We did not evaluate the accuracy of information

provided to vaccine recipients but used the survey to determine what information was available to servicemembers and how helpful they found the information. Questionnaire respondents were, with three exceptions, vaccine recipients who were available at the time of our site visits. Because the respondents were not randomly selected, their responses cannot be projected. Details of the questionnaire and responses are in appendix III. We also discussed program plans for future communications and education initiatives with program officials.

We conducted our review from July 1998 through July 1999 in accordance with generally accepted government auditing standards.

Packaging and Shipping Protocol

This appendix describes DOD's packaging and shipping protocol for transporting anthrax vaccine from BioPort to military sites. DOD's packing and shipping goals are to have zero defects (such as package damage that would ruin the vaccine) and zero loss of accountability (such as packages disappearing due to mishandling or theft).

Packaging

BioPort packages vials of anthrax vaccine according to the protocol designed by DOD and BioPort to maintain doses within an acceptable temperature range (1–25°C). The vials are shipped in an insulated container along with gelatin cold-packs, a digital monitor that records the temperature every 5 minutes throughout transit, an addressed envelope for return of the monitor, and an address label for return of the packaging materials to BioPort. In tests of the temperature monitor, DOD found its failure rate to be just under 1 percent—usually due to a mechanical or electrical problem. There are several layers in each container:

- The first layer is composed of two gelatin cold-packs. In spring and fall, one of the packs is frozen before packing; in summer, both are frozen. In winter, neither is frozen.
- The second layer is made of cold-packs that are never frozen before shipping. The vaccine vials and the temperature monitor are packed between the second and third layers.
- The third layer holds two more cold-packs cooled to 4°C.

The highest temperature recorded since use of this protocol began (in a shipment sent to southwest Asia) has been 16°C.

Shipping

DOD's shipments of anthrax vaccine are managed by the U.S. Army Medical Materiel Agency (USAMMA). Shipments in the continental United States, nearly all of which are by air, are performed by Federal Express. Some overseas shipments are also carried by Federal Express, but most are delivered by DHL World Wide Express. Should either Federal Express or DHL World Wide Express go on strike, the other carrier would take over delivery of shipments.

The shipping label on each box has a code to track the package, giving DOD "total asset visibility." As part of its Priority Alert program, Federal Express gives DOD's shipments priority and aggressively pursues solutions to problems that arise. The shipping box carries fluorescent "Priority Alert"

labels on all sides to notify handlers that the box must be moved first and never bumped. If a Priority Alert shipment is held up by problems with Federal Express' transportation vehicles, the company immediately arranges with a common carrier to move the shipment. Federal Express employees take procedural problems uncovered through this program directly to the company's managers for priority resolution.

Federal Express has given USAMMA a computer system to track shipments, and pagers are used for the two organizations to maintain 24-hour communication. BioPort enters information on an outgoing vaccine shipment into the Federal Express system, establishing instant visibility. The program can also generate reports that identify, among other things, systemic problems with shipments to a particular military installation. USAMMA, thus alerted, can check with the site and clarify the situation. Special software, PC Track, will soon link USAMMA to Federal Express' mainframe computer and provide more communication regarding shipments.

USAMMA notifies military recipients beforehand of imminent shipments and gives instructions to alert local security about the shipment and verify that proper refrigeration will be available in the receiving area. USAMMA also faxes them a checklist to be used when the shipment arrives. Upon receipt, the recipient visually inspects the package for damage. If damaged, the recipient is to refuse shipment and contact USAMMA. The military recipient then refrigerates the vaccine at 2–8°C in a restricted area and returns the monitor to USAMMA. The recipient awaits authorization from USAMMA, which checks that temperature data recorded by the monitor did not exceed temperature tolerances before releasing the vaccine. If the package's interior temperature has been too high or low at any point in transit, it shows up on the monitor's read-out as a positive or negative spike (if the box were opened en route, for example, a positive spike would be recorded). Any deviation is recorded on a special form and sent to BioPort for assessment.

When a shipping problem occurs, USAMMA conducts a risk analysis that runs through an "if/then" protocol. Also, whenever a route is changed, USAMMA runs a test shipment of one vial.

Survey of Servicemember Views of the Anthrax Vaccine Immunization Program

We surveyed vaccine recipients in all four services about the anthrax vaccine program and obtained responses from 249 active duty servicemembers: 18 percent (44) in the Army, 12 percent (31) in the Navy, 34 percent (85) in the Air Force, and 36 percent (89) in the Marine Corps. Because our survey participants were not randomly selected, the survey results cannot be projected to a larger military population.

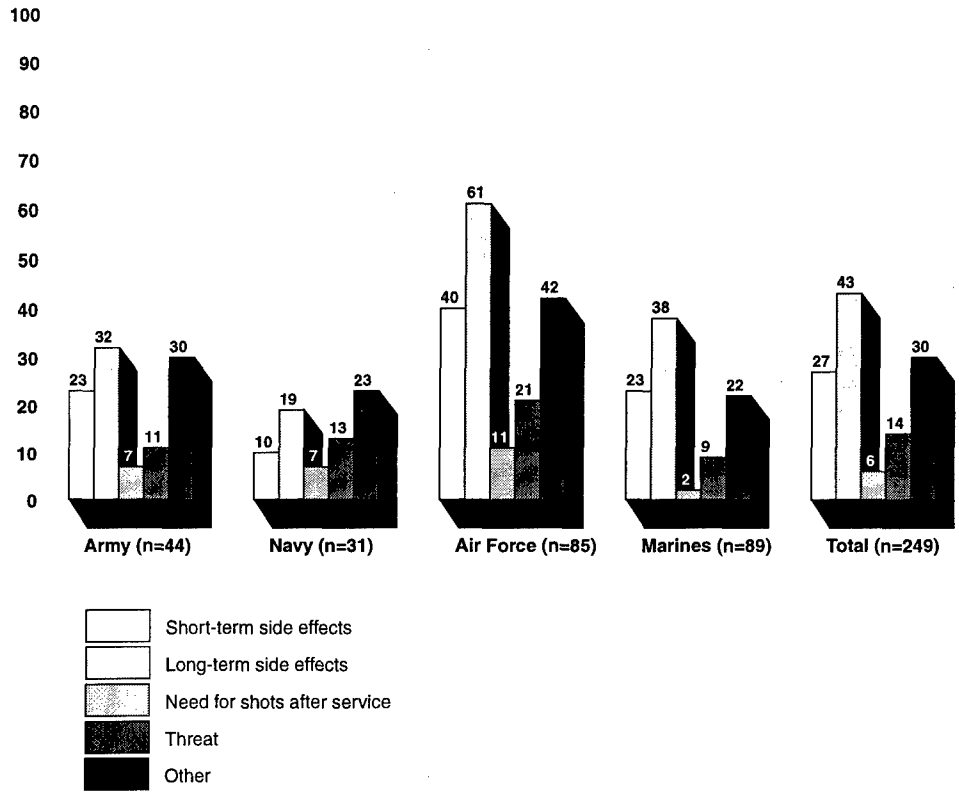
- About 89 percent (220) were enlistees and 11 percent (28) officers.[1]
- 56 percent (140) were between the ages of 18 and 25, the other 44 percent were almost equally distributed between the ages of 26 and 33 and 34 and 49. Most participants in the Army, the Navy, and the Marine Corps were between 18 and 25, while those in the Air Force tended to be older.
- About 86 percent (213) were men.
- Approximately 65 percent (162) identified themselves as Caucasian, 22 percent (54) as Black, and the remaining 13 percent (32) as either Hispanic American, Native American, or Asian American. One participant did not respond to the question.
- The number of respondents for each question varied because they were instructed to skip questions that did not apply to their individual case.

Servicemembers Wanted Information on Possible Long-term Effects of the Vaccine and Other Issues

Two-thirds (164) of survey participants said they wanted information they had not received, including information on temporary or short-term side effects of the vaccine, possible long-term side effects, the vaccination routine after active duty, the anthrax threat, or other information. Participants from all four services also said they wanted information they had not received, especially on possible long-term side effects (about 43 percent—106—of all participants). Relative to their peers from the other services, a higher proportion of Air Force participants expressed a need for information they had not received, particularly on possible long-term side effects (see fig. 5).

[1] One participant in the survey did not indicate military rank.

Figure 5: Percentage of Participants Wanting More Information

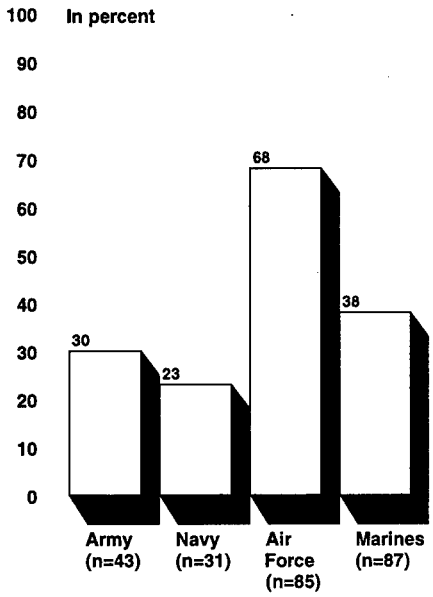


Source: GAO.

Examples of topics not listed in the survey about which respondents wanted more information included why more than three vaccinations are necessary, whether the vaccine has been tested by a qualified source, the history of the vaccine, the anthrax disease, and the extent to which the vaccine has been used to immunize humans.

Figure 6 shows the percentage of participants, by service, who responded that they experienced reactions. The Air Force had the highest rate (68 percent, or 58 out of 85 respondents).

Figure 6: Percentage of Respondents Reporting Short-term Adverse Effects, by Service



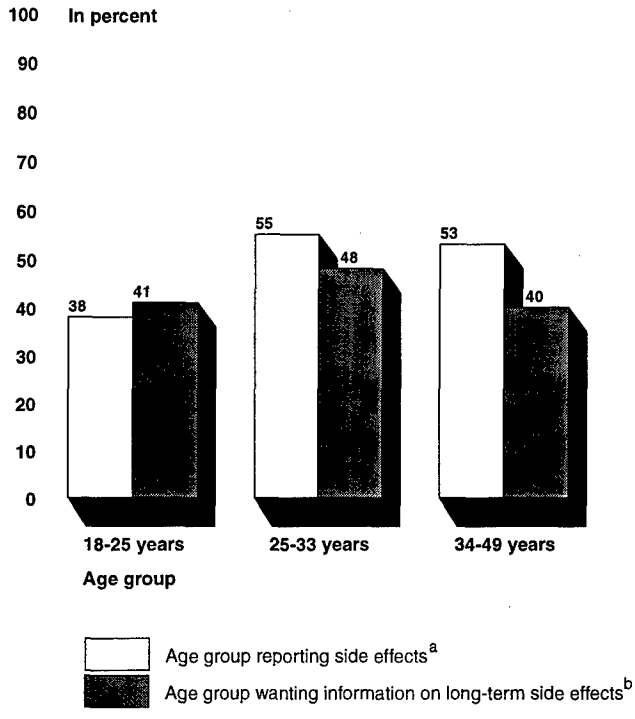
Note: Does not include three respondents who had not received their first shot.

Source: GAO.

Of the 111 survey participants who said they had experienced short-term reactions, 57 percent (59) said they wanted information on possible long-term adverse effects.

Figure 7 shows the percentage of participants in three age groups who reported having adverse effects and who said they wanted more information on possible long-term effects.

Figure 7: Percentage of Respondents Reporting Adverse Effects and Wanting Information, by Age Group



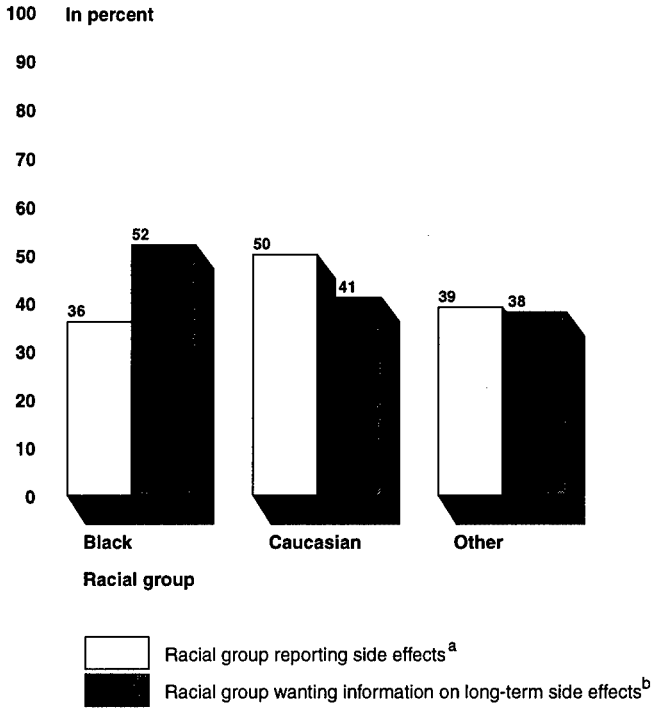
[a] Excludes three respondents who had not yet received their first vaccination. The numbers in each group are: 18 to 25 years, 138 respondents; 25 to 33 years, 55 respondents; 34 to 49 years, 53 respondents.

[b] Includes all respondents. The numbers in each group are: 18 to 25 years, 140 respondents; 25 to 33 years, 56 respondents; 34 to 49 years, 53 respondents.

Source: GAO.

As shown in figure 8, participants in all race categories said they had experienced adverse effects and wanted information on possible long-term adverse effects.

Figure 8: Percentage of Respondents Reporting Adverse Effects and Wanting Information, by Race



[a] Does not include one respondent who did not specify race and three who had not received their vaccination. The numbers for each group are: Black, 53 respondents; Caucasian, 161 respondents; other, 31 respondents.

[b] Does not include one respondent who did not specify race. The numbers for each group are: Black, 53 respondents; Caucasian, 162 respondents; other, 32 respondents.

Source: GAO.

Comments From the Department of Defense

DEPARTMENT OF THE ARMY
OFFICE OF THE SURGEON GENERAL
5109 LEESBURG PIKE
FALLS CHURCH, VA 22041-3258

REPLY TO ATTENTION OF

0 1 OCT 1999

Office of the Surgeon General

Mr. Norman J. Rabkin
Director, National Security Preparedness Issues
National Security and International Affairs Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Rabkin:

This is the Department of Defense (DOD) response to the GAO draft report "MEDICAL READINESS: DOD Faces Challenges in Implementing Its Anthrax Vaccine Immunization Program", dated 3 September 1999 (GAO Code 703254/OSD Case 1888).

While DOD generally concurs with the draft report findings and recommendations, the report did not fully characterize some key aspects and successes of the AVIP. In 18 months of implementation, DOD immunized 340,000 Service Members representing over 1,121,000 immunizations. Although the GAO report focused on the DEERS data repository, it was the Service Immunization Tracking Systems, by design, which successfully tracked each of these immunizations from over 1,200 locations and 9,100 separate units worldwide. At least three paper records serve as redundant safety measures to ensure immunizations are documented. There isn't a State, Federal or private sector health agency in the world that can match this DOD accomplishment.

The GAO investigation acknowledged the grave and urgent danger facing Service Members from the lethal threat of anthrax, but did not mention the excellent long-term safety record of the vaccine, examined over a period of 44 years, in over nine studies or surveys, involving 14,284 patients and 45,742 administered doses. Adding the 1.1 million doses given since March 1998 and analysis of adverse events by an outside panel of national vaccine experts, using national reporting instruments, the vaccine demonstrates a compelling safety record. And while we did not produce a formal written "plan" dealing with an endless array of possible vaccine delivery events and contingencies, the AVIP Agency does have a March 1999 algorithm which addresses the trigger points and options for ensuring continued, measured implementation of the AVIP.

Additional technical comments have been provided directly to the GAO staff for incorporation into the report. Our specific responses to your recommendations are enclosed. We appreciated the opportunity to work with the GAO survey team and the ability to comment on the draft report.

Sincerely,

Ronald R. Blanck

Ronald R. Blanck
Lieutenant General, US Army
The Surgeon General

Enclosure
As stated

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GAO DRAFT REPORT-DATED SEPTEMBER 3, 1999
GAO CODE 703254/OSD CASE 1888

"MEDICAL READINESS: DOD Faces Challenges in Implementing its Anthrax Vaccine Immunization Program"

DEPARTMENT OF DEFENSE COMMENTS

To address the challenges DOD faces in vaccinating its total force against anthrax, the GAO recommended that the Secretary of Defense direct the Secretary of the Army, as Executive Agent for the anthrax vaccination program to:

Now on p. 35.

Recommendation 1: Prepare a formal, written plan that addresses strategies to deal with (1) contingencies for vaccinating service members if the supply of anthrax vaccine is not augmented with new production and (2) the risks associated with reliance on a single vaccine manufacturer. (p. 29/GAO Draft Report)

DoD Response: Concur. DOD will transform the current contingency algorithm chart with trigger points and options for ensuring continued, measured implementation into a formal written plan to satisfy the GAO review.

Now on p. 35.

Recommendation 2: Routinely collect and report, among other program performance measures, data on the number of service members refusing to take the vaccine. (p. 29/GAO Draft Report)

DoD Response: A draft policy memorandum, subject: Reporting Service Members Refusing the Anthrax Vaccine, is currently being staffed with the AVIP Executive Agent's General Officer Synchronization Team.

Now on p. 35.

Recommendation 3: Improve DoD guidance and training on how to report adverse events to the Vaccine Adverse Event Reporting System, and refrain from inappropriately using data from the system to report adverse reaction rate (p. 29/GAO Draft Report).

DoD Response: Concur. DOD initiated several actions in the past six months:

1. Apr 99, updated DOD "Force Health Protection Against Anthrax Leaders Briefing", required to be given to all DOD Service Members and DOD Emergency Essential civilians by supervisors, commanders prior to receiving the anthrax immunization. Slides 12, 13, 14 clearly state, for both the AC and RC, "any vaccine associated adverse event may be reported through VAERS by either the patient or provider...in writing or by calling 1.800.822.7967...reporting instructions are available on the Internet at http://www.fda.gov/cber/vaers.htm."

1

2. Apr 99, updated DOD "Anthrax Vaccine Immunization Program Health Care Providers Briefing". Slides 31,32, 33 provide clinical guidelines for VAERS reporting in addition to the guidance provided in the Leaders Briefing above.

3. DOD Policy Memo "Policy for Reporting Adverse Reactions Associated with the Anthrax Vaccine Immunization Program (AVIP)" created 30 Jun 98, staffed with the Services 21 Apr 99, outlines clinical protocols and algorithms for submitting VAERS; also requires submission of an "Anthrax Vaccine Adverse Reaction Supplemental Form". The memo is currently at ASD (HA) for signature.

4. 20 Jul 99, ASD (HA) Memorandum - Ensuring Reservists Have Full Access to Department of Defense (DOD) Medical Treatment Facilities (MTF) for Treatment and Evaluation of Adverse Events from DOD Directed Immunizations, clearly outlines patient or provider submission of Form VAERS-1 with phone numbers, Internet address, etc.

5. DOD Clinician Anthrax Vaccine Guidelines FACT SHEET outlines anthrax vaccine clinical protocols, pre-treatments, specialty referral process, contraindications, categorization of mild, moderate, severe and systemic reactions and associated treatment algorithms. The FACT Sheet clearly outlines enhanced patient or provider Form VAERS-1 reporting with all associated phone and access numbers.

6. AVIP Agency prominently posts Form VAERS-1 reporting options, sources of information, downloadable copies of the form on the anthrax Internet website www.anthrax.osd.mil and silent training aids distributed to Service Members receiving the anthrax immunization.

7. AVIP Agency established links from the DOD anthrax web site to the Food and Drug Administration VAERS information page to facilitate direct FDA reporting.

8. AVIP Agency 1.877.GETVACC Anthrax Information Line, implemented 9 August 1999, routinely provides information on patient or provider reporting of adverse events and Form VAERS-1 access and processing.

9. AVIP Speaker's Bureau/Open House Site Visits prominently discusses patient or provider VAERS reporting access, options and process during their tour.

10. Revised and simplified the AVIP VAERS summary data chart posted on the www.anthrax.osd.mil Internet site.

11. Each of the Services disseminated Service-wide messages to the field outlining VAERS reporting procedures, encouraging Service Member, Health Care Provider or guardian submission of Form VAERS-1 for any vaccine adverse event.

2

12. Sep 99, updated the new DOD quad fold information brochure "What Everyone Needs to Know About The Anthrax Vaccine" (replaces the three current versions of the Tri-fold) given to every Service Member, family member and Civilian prior to immunization. Now provides updated VAERS reporting access, procedures, phone numbers and web site information.

13. The Service Surgeon Generals included VAERS reporting procedures in all major Service/Joint medical proceedings, conferences, etc.

14. Additionally, the Anthrax Vaccine Expert Committee (AVEC) continues to review every anthrax vaccine Form VAERS-1 submission to monitor the safety of the program.

Now on p. 35.

Recommendation 4: Design and conduct a study on possible long-term side effects of the anthrax vaccine and develop a communication plan to provide servicemembers information on the status of this effort. (p. 30/GAO Draft Report)

DoD Response: Concur. DOD established a Longitudinal Studies Concept Committee to explore relevant questions regarding the safety of the anthrax vaccine, define research needs and identify subsequent research design. The Committee consists of DOD, FDA, CDC and Armed Forces Epidemiological Board (AFEB) representatives and met on 24 Aug and 22 Sep 99. The Committee defined gaps in knowledge, set a research agenda and recommended appropriate scientific designs to answer these questions, including comparison groups, statistical methods and ethical oversight. These designs will draw from traditional scientific approaches: surveys, database studies, records reviews, or other methods, depending on the specific question to be answered. Some studies can likely be completed in a few months; others will require several years. DOD programmed $2M to fund this Longitudinal Studies concept in the fiscal year 2000 Program Objective Memorandum and appropriate amounts in subsequent years.

Now on p. 35.

Recommendation 5: Continue improvement of educational efforts by regularly surveying vaccine recipients and addressing educational needs. (p. 30/GAO Draft Report).

DoD Response: Concur. DOD recently sponsored development of a Public Health award winning educational survey for administration to service members who started or are scheduled to start the vaccination series. This survey collects information about the availability, timeliness and effectiveness of AVIP educational materials prior to and during the period that service members are receiving anthrax vaccinations. DOD already collected hundreds of surveys and continues to collect them through multiple venues. Additionally, the AVIP Agency collects informal survey information from telephone calls to the toll free information line and from emails received from AVIP web site users. Collectively,

this survey data is providing insightful information regarding the effectiveness of educational information efforts. DOD plans to expand survey collection and research efforts.

Now on p. 36.

Recommendation 6: Assess the timeliness of personnel duty station data in the Defense Enrollment Eligibility Reporting System to determine where time lags occur in obtaining data and take or recommend steps to resolve untimely submissions. (p. 30/GAO Draft Report)

DoD Response: Concur. We will take aggressive steps through the AVIP Executive Agent to ensure the timely and accurate updating of personnel data in both the Service Immunization Tracking Systems and DEERS.

Now on p. 36.

Recommendation 7: Review service requirements for recording and tracking medical data and incorporate plans to address these requirements in future upgrades to the Composite Health Care System. (p. 30/GAO Draft Report)

DoD Response: Concur. The Services have already developed/employed excellent automated systems for recording, managing and reporting immunization data at the unit level in the 18 months since AVIP execution. These Service systems allow us to track the over 340,000 Service Members and 1,120,000 immunizations given at 1,200 locations within 9,100 separate units worldwide. At least two or more paper back-up systems offer additional redundancy for assured recording of immunizations. DEERS serves AVIP as the final repository for this data. The AVIP Executive Agent will aggressively pursue standardization, simplification and training of all current Service Immunization Tracking Systems into a successor, joint service, long-term immunization tracking system. We have already identified the Service functional requirements needed by unit commanders, supervisors and medical personnel at both home station and deployed locations worldwide.

Now on p. 36.

Recommendation 8: Include response "to avoid the mandatory anthrax vaccine" (or words to that effect) among answers to questions on the reasons for resigning from the military in a DoD-wide exit survey expected to be administered in 2000. (p. 30/GAO Draft Report)

DoD Response: Partially concur. An exit survey to assess overall recruiting and retention issues should be conducted. However, it is not appropriate to single out anthrax vaccinations as a reason for departing the military any more than the potential hundreds of other reasons for leaving the service. A question of this nature is "leading", produces survey bias and fails to capture the multi-faceted and complex nature of why service members depart the military. Our survey construction experts indicate the use of "focus groups" and other population sampling vehicles to assess the impact of the AVIP on retention is a far more appropriate assessment process.

GAO Contacts and Staff Acknowledgments

GAO Contacts

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Acknowledgments

In addition to those named above, Margaret Best, Jack Edwards, Julia Kennon, Melissa McDowell, MaeWanda Michael-Jackson, and Michael Whitlock made key contributions to this report.

Related GAO Products

Medical Readiness: Issues Concerning the Anthrax Vaccine (GAO/T-NSIAD-99-226, July 21, 1999).

Contract Management: Observations on DOD's Financial Relationship With the Anthrax Vaccine Manufacturer (GAO/T-NSIAD-99-214, June 30, 1999).

Combating Terrorism: Observations on Growth in Federal Programs (GAO/T-NSIAD-99-181, June 9, 1999).

Medical Readiness: Safety and Efficacy of the Anthrax Vaccine (GAO/T-NSIAD-99-148, Apr. 29, 1999).

Gulf War Illnesses: Questions About the Presence of Squalene Antibodies in Veterans Can Be Resolved (GAO/NSIAD-99-5, Mar. 29, 1999).

Combating Terrorism: Observations on Biological Terrorism and Public Health Initiatives (GAO/T-NSIAD-99-112, Mar. 16, 1999).

Combating Terrorism: Observations on Federal Spending to Combat Terrorism (GAO/T-NSIAD/GGD-99-107, Mar. 11, 1999).

Chemical and Biological Defense: Observations on DOD's Plans To Protect U.S. Forces (GAO/T-NSIAD-98-83, Mar. 17, 1998)

Combating Terrorism: Efforts to Protect U. S. Forces in Turkey and the Middle East (GAO/T-NSIAD-98-44, Oct. 28, 1997).

Combating Terrorism: Status of DOD Efforts to Protect Its Forces Overseas (GAO/NSIAD-97-207, July 21, 1997).

Defense Health Care: Medical Surveillance Improved Since Gulf War, But Mixed Results in Bosnia (GAO/NSIAD-97-136, May 13, 1997)